

First Steps – How to Design a SOS Exhibit

Also online at: http://www.sos.noaa.gov/docs/first_steps.html

Introduction

This guide is meant to cover the first steps for planning and designing a Science On a Sphere® exhibit. No two SOS exhibits are alike, so what is described here is a recommended setup based on lessons learned. While many of the parameters can be adjusted to meet your sites desires, there are limits to how much the exhibit can be altered. Please work with the SOS team every step of the way to ensure that your SOS exhibit will reach its full potential.

Facility Space

The very first thing to consider for a Science On a Sphere® exhibit is space. Science On a Sphere® is a room-sized exhibit. The sphere itself is 68" in diameter. The footprint for the exhibit is generally 30'x30', with ceiling heights greater than 12'. The sphere is hung in the middle of this space with four projectors placed at the corners of the space, 90° apart from one another. For the suggested exhibit design, please refer to the [SOS Floor Plan](#). The sphere only weighs about 50lbs and is hung from the ceiling by cables. [Sphere Assembly and Hanging Pictures](#). Typically the sphere is positioned 52" above the floor, which puts the equator of the sphere at 7'2".

The projectors can either be suspended from the ceiling, or mounted to floor with stands. For floor-mounted projectors, it is important to create a barrier around the projectors that isolates the projectors from people bumping them. When deciding between floor or ceiling mounted projectors, it is important to consider vibration. Any vibration of the projectors shows in the images on the sphere. If there is a floor above the exhibit space with high foot traffic, then ceiling mounted projectors might not be a good idea. If the floor is not solid, then floor mounted projectors are likely to show significant vibration. Wall-mounted projectors can also be used, but tend to have the most problems with vibrations. [Projector Mount Examples](#) Regardless of mounting style, sites need to have a projector mount that allows for adjustments on the x, y, and z planes.

Traditionally, the projectors are positioned to be level with the equator of the sphere, but as the SOS software has improved, some flexibility in projector position has been introduced. A [dark rectangle](#), at the bottom and top of the sphere, is created because light from the projectors cannot reach those parts of the sphere. Positioning the projectors at the equator of the sphere minimizes the dark spots. However, many sites with ceiling-mounted projectors like to raise the height of the projectors to move them out of reach. The projectors can be moved up to 8" above the equator of sphere, which gets them well out of reach, but also enlarges the dark spot on the bottom of the sphere.

Another area of flexibility for the projectors is their distance from the sphere. While this distance is highly projector dependent, the recommended distance from the projector lens to the center of the sphere is 17' – 19'. Depending on [projector make and model](#), those distances can be altered somewhat. The SOS team can help you find a projector to meet your needs. It is recommended that all the projectors are the same distance from the sphere, but that can be adjusted as well using the SOS software.

It's not only the size of the space that has to be considered, but also the aesthetics. The main aesthetic consideration for the space is the light level. Science On a Sphere® looks most brilliant in a dimly lit space, though the exhibit has been setup in several lobbies and other spaces with high light levels. Direct light and sunlight will washout the images on the sphere. Tinting any exterior windows in the exhibit space is highly recommended.

In order to protect the sphere from inquiring audiences, sites should have a railing or barrier. The recommended size is a 12'-14' diameter circle that is 3' tall. This size railing is large enough to prevent the audience from touching the sphere, but small enough to let audiences get a close-up look. The design of the railing is up to each individual site. [Example Railings at Existing Sites.](#)

The SOS exhibit can either be incorporated into a larger exhibit, or showcased alone. Some sites have put SOS into a room that is dedicated solely to SOS with only one entrance like a theater, others have secluded the exhibit but have many entrances and exits, and still others have SOS out in the open amongst other exhibits. There is no right or wrong way to set up the exhibit, but programs utilizing the sphere will probably look different depending on the space. A theater setup lends itself well to schedule presentations with a presenter, while a sphere in an exhibit hall works well in an unattended mode. Many existing SOS sites have conducted [evaluations](#) as to the pros and cons of the various set-ups. To see different setups, look through the [pictures](#) from existing sites.

Technical Specs

Once the space has been defined, the next step to take is selecting the equipment to be used. All of the equipment for Science On a Sphere®, with the exception of the sphere itself, is off the shelf equipment that can be purchased from numerous sites. A [generic list of equipment](#) is available, however the needs of each site vary, so it is important discuss with the SOS team which equipment your site needs. There are very precise [computer specifications](#) for the computers that operate SOS. Sites are encouraged to buy two computers - one operational computer, and one spare. To supplement the computers, an additional 6 Gb of system RAM needs to be purchased for each computer. Both computers are configured identically for easy replacement should the operational computer encounter any problems. Due to the graphic demands that SOS makes, two third party, high end [graphics cards](#) need to be purchased separately for each system.

The computers are connected via a gigabit network. A 8 port gigabit network switch and CAT 5e or CAT 6 cabling are required to connect all the computers to the network. It is important that the right cabling be used to ensure proper system operation. [Wiring Diagram](#) Typically all the computers, network switch, and components are stored in one central location, along with a keyboard, mouse, monitor and KVM. UXGA cabling is used to connect the projectors to the computers. The cable length for the UXGA cables needs to be less than 100', lengths greater than 100' require VGA signal amplifiers or a different wiring strategy. When considering a computer location, temperature and air flow of the space needs to be taken into account. The six computers generate a fair amount of heat and need to remain cool, so they cannot be put in a closet without ventilation.

An audio system serves to enhance the Science On a Sphere exhibit by allowing the site to play narrated pieces and use microphones for presenters. The details of the audio setup are left up to each site, but specifications for a reference [audio system](#) are provided. When designing the SOS exhibit, it is important to consider how sound will travel between the SOS exhibit and

any surrounding exhibits, and to plan accordingly. In order to perform projector alignment of the sphere and give live presentations, a remote control is required. The current remote control in use is the [Wii remote](#). In order for this to work, the sites need to purchase a Bluetooth dongle, a Wii remote, a Wii nunchuk and a Wii charger. In order for the Wii remote to connect to the SOS system must be within 100' of the area where the remote will be used. For projector alignment purposes, the remote needs to work on all sides of the sphere. Using a USB extender to get the Bluetooth dongle within the 100' range is helpful at many sites. The 100' distance for the Bluetooth dongle diminishes when walls and other barriers are between the dongle and remote.

The current class of computers draws about 1.5 AMPS each and should be on a UPS. The UPS protect the computers from power spikes and bumps. The projectors draw 3.5 AMPS each and sites should consider putting them on UPS units as well, especially if the site has unreliable. Power should be readily accessible from each of the projector locations, as well as at the central computer location.

Another nice feature to add is an internet line with a static IP address. This serves two main purposes. First, it allows the site to automatically download real-time data for display on the sphere. Second, if the site's security permits it, it allows the SOS team to log in remotely to the computers and do any troubleshooting or maintenance required. Internet speeds of 3-4 Mbps are suggested.

Additional Options

Many sites choose to customize their Science On a Sphere® exhibit through the addition of touch-screen kiosks and auxiliary displays. The NOAA SOS team does not write or maintain the software for these additions. However, some of the sites that have created their own software make it available to all SOS sites. The Tech Museum in San Jose, CA wrote and maintains software to run a touch-screen kiosk. Contact [Mike Drennan](#) at The Tech for details and pricing. The other piece of software that several sites are using was written by two students at the University of Colorado and is freely available. This software links PowerPoint with Science On a Sphere, allowing a corresponding PowerPoint show to play on auxiliary monitors during SOS presentations. Details and instructions for the [CU Auxiliary Display Software](#) are available online.